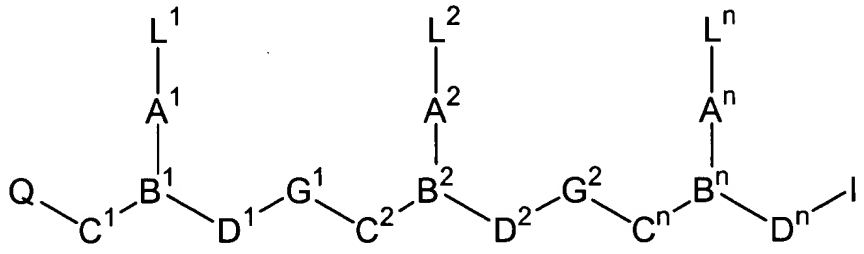
III. AMENDMENT

PLEASE ENTER THE FOLLOWING AMENDMENT WITHOUT PREJUDICE OR DISCLAIMER. Applicant reserves the right to file a divisional or continuation application to the originally filed claims.

(Claims 1-2, Presently Canceled)
(Claims 3-9, Previously Canceled)

10. (Currently Amended) A probe set comprising at least thirteen PNA probes of 10 to 30 subunits in length and which is suitable for detecting, identifying or enumerating human chromosomes X, Y, 1, 2, 3, 6, 8, 10, 11, 12, 16, 17 and/or 18 in a sample wherein said PNA probes have the formula:



wherein,

n is at least 2,

each of L^1-L^n is independently selected from the group consisting of hydrogen, hydroxy, (C_1-C_4)alkanoyl, naturally occurring nucleobases, aromatic moieties, DNA intercalators, nucleobase-binding groups, heterocyclic moieties, and reporter ligands;

each of C^1-C^n is $(CR^6R^7)_y$ where R^6 is hydrogen and R^7 is selected from the group consisting of the side chains of naturally occurring alpha amino acids, or R^6 and R^7 are independently selected from the group consisting of hydrogen, (C_2-C_6)alkyl, aryl, aralkyl, heteroaryl, hydroxy, (C_1-C_6)alkoxy, (C_1-C_6)alkylthio, NR^3R^4 and SR^5, where R^3 and R^4 are as defined above, and R^5 is hydrogen, (C_1-C_6)alkyl, hydroxy-, alkoxy-, or alkylthio- substituted (C_1-

C_6)alkyl, or R^6 and R^7 taken together complete an alicyclic or heterocyclic system;

each of D^1-D^n is $(CR^6R^7)_z$ where R^6 and R^7 are as defined above;

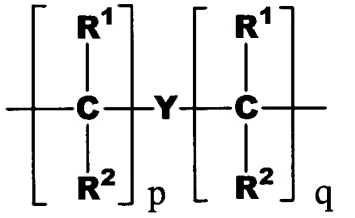
each of y and z is zero or an integer from 1 to 10, the sum y+z being greater than 2 but not more than 10;

each of G^1-G^{n-1} is $-NR^3CO-$, $-NR^3CS-$, $-NR^3SO-$ or $-NR^3SO_2-$, in either orientation, where R^3 is as defined above;

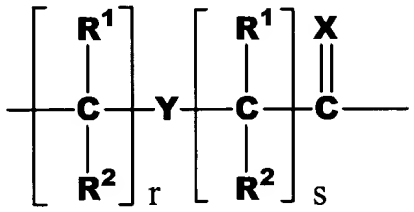
each of A^1-A^n and B^1-B^n are selected such that:

(a) A is a group of the formula (IIa), (IIb), (IIc), or (IId), and B is N or R^3N^+; or

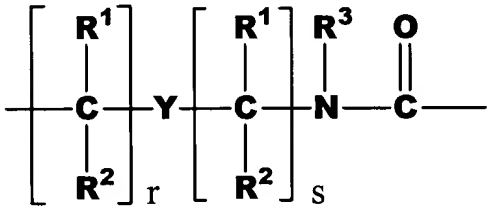
(b) A is a group of formula (IId) and B is CH;



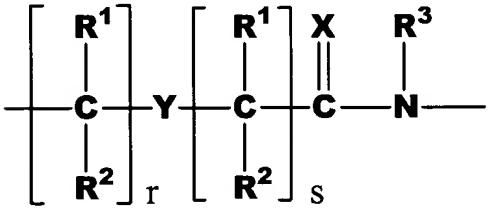
IIa



IIb



IIc



IId

where:

X is O, S, Se, NR^3, CH_2 or $C(CH_3)_2$;

Y is a single bond, O, S or NR^4;

each of p and q is zero or an integer from 1 to 5, the sum of p+q being not more than 10;

each of r and s is zero or an integer from 1 to 5, the sum of r+s being not more than 10;

each R^1 and R^2 is independently selected from the group consisting of hydrogen, (C_1-C_4)alkyl which may be hydroxy- or alkoxy- or alkylthio-substituted, hydroxy, alkoxy, alkylthio, amino and halogen; and

each R^3 and R^4 is independently selected from the group consisting of hydrogen, (C_1-C_4)alkyl, hydroxy- or alkoxy- or alkylthio-substituted (C_1-C_4)alkyl, hydroxy, alkoxy, alkylthio and amino;

Q is $-CO_2H$, -CONR'R", $-SO_3H$ or $-SO_2NR'R"$ or an activated derivative of $-CO_2H$ or $-SO_3H$; and

I is –NHR'"R"" or –NR'"C(O)R"", where R', R", R'" and R"" are independently selected from the group consisting of hydrogen, alkyl, amino protecting groups, reporter ligands, intercalators, chelators, peptides, proteins, carbohydrates, lipids and steroids, wherein,

the one or more PNA probes of the set that are specific for detecting human chromosome X comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

CTT-CAA-AGA-GGT-CCA-CGA (Seq. ID No. 1); AGG-GTT-CAA-CTG-TGT-GAC (Seq. ID No. 2); GAA-ACT-TCT-GAG-TGA-TGA (Seq. ID No. 3); CAG-TCA-TCG-CAG-AAA-ACT (Seq. ID No. 4); AGA-TTT-CAC-TGG-AAA-CGG (Seq. ID No. 5); GTT-ATG-GGA-AGG-TGA-TCC (Seq. ID No. 6); TCG-AGC-CGC-AGA-GTT-TAA (Seq. ID No. 7); CTA-TTT-AGC-GGG-CTT-GGA (Seq. ID No. 8) and TAC-AAG-GGT-GTT-GCA-AAC (Seq. ID No. 9);

the one or more PNA probes of the set that are specific for detecting human chromosome Y comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

CCA-TAT-GCA-GTT-ATA-AGT-AGG (Seq. ID No. 10); TAT-TGT-ACC-AAG-CAG-AGT-ACC (Seq. ID No. 11); GGT-ATA-TAT-AAG-ATG-ACA-

CAG-GA (Seq. ID No. 12); GTT-AGT-TAT-ATT-GGG-TGA-TAT-GT (Seq. ID No. 13); TCA-CAT-AAT-AGA-CAA-CAT-AC (Seq. ID No. 14); CAG-AAG-AGA-TTG-AAC-CTT (Seq. ID No. 15) and GGC-ATA-GCA-CAT-AAC-ATG (Seq. ID No. 16);

the one or more PNA probes of the set that are specific for detecting human chromosome 1 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

AAT-CGT-CAT-CGA-ATG-AAT (Seq. ID No. 17) and CAT-TGA-ACA-GAA-TTG-AAT (Seq. ID No. 18);

the one or more PNA probes of the set that are specific for detecting human chromosome 2 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

GTT-TTC-AGG-GGA-AGA-TAT (Seq. ID No. 19); TGT-GCG-CCC-TCA-ACT-AAC (Seq. ID No. 20); GAA-GCT-TCA-TTG-GGA-TGT (Seq. ID No. 21); CCA-ATA-AAA-GCT-ACA-TAG-A (Seq. ID No. 22); GAA-AAA-GTT-TCT-GAC-ATT-GC (Seq. ID No. 23); TAG-TTG-AAG-GGC-ACA-TCA (Seq. ID No. 24); CAC-AAA-TAA-GAT-TCT-AAG-AAT (Seq. ID No. 25) and TCA-AAA-GAA-TGC-TTC-AAC-AC (Seq. ID No. 26);

the one or more PNA probes of the set that are specific for detecting human chromosome 3 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

ATA-ATT-AGA-CCG-GAA-TCA-T (Seq. ID No. 27); GCT-GTT-TTC-TAA-AGG-AAA-G (Seq. ID No. 28); AAG-ACT-TCA-AAG-AGG-TCC (Seq. ID No. 29); TTT-GTC-AAG-AAT-TAT-AAG-AAG (Seq. ID No. 30); CAA-GAT-TGC-TTT-TAA-TGG (Seq. ID No. 31); TGT-GTA-TCA-ACT-CAC-GGA (Seq. ID No. 32); CCT-CAC-AAA-GTA-GAA-ACT (Seq. ID No. 33); GAA-AAA-GCA-GTT-ACT-GAG (Seq. ID No. 34); TAA-TAA-TTA-GAC-GGA-ATC-AT (Seq. ID No. 35); TTA-CAG-GGC-ATT-GAA-GCC (Seq. ID No. 36); CAG-TTA-TGA-AGC-AGT-CTC (Seq. ID No. 37); CAC-ACC-AGA-AAA-AGC-AGT (Seq. ID No. 38); AAG-GGT-AAA-CAC-TGT-GAG (Seq. ID No. 39); AGA-CAA-CGA-AAT-ATC-TTC-ATG (Seq. ID No. 40);

CTA-GCA-GTA-TGA-GGT-CAA (Seq. ID No. 41); GCA-GAC-TTC-AGA-AAC-AGA (Seq. ID No. 42); GGC-CTC-AAA-GAC-GTT-TAA (Seq. ID No. 43); GTG-AAA-GTT-CCA-AGT-GAA (Seq. ID No. 44); GAG-TGC-TTT-GAA-GCC-TAC (Seq. ID No. 45); GAA-ACA-GCA-GAG-TTG-AAA (Seq. ID No. 46); TGC-AGA-GAT-CAC-AAC-GTG (Seq. ID No. 47); ACA-AAG-AAT-CAT-TCG-CAG (Seq. ID No. 48);and AGT-GTT-AGA-AAA-CTG-CTC (Seq. ID No. 49);

the one or more PNA probes of the set that are specific for detecting human chromosome 6 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

CTG-TTC-AGA-GTA-ACA-TGA (Seq. ID No. 50); CCG-CTT-GGA-AAT-ACT-ACA (Seq. ID No. 51); GAA-ATG-GAA-ATA-TCT-CCC-C (Seq. ID No. 52); TCT-AGG-AGG-TCC-AAT-TAT (Seq. ID No. 53); GAA-TTC-CCA-AGT-GGA-TAT (Seq. ID No. 54); CTG-TAG-GTT-TAG-ATG-AAG (Seq. ID No. 55); AAG-GAG-TGT-TTC-CCA-ACT (Seq. ID No. 56); GGC-TTC-AAG-GCG-CTC-TAA (Seq. ID No. 57); GCA-GAG-ACT-TCA-AAG-TGC (Seq. ID No. 58); CAC-ACA-CAC-GGT-GGA-CCA (Seq. ID No. 59); CAA-AGG-GAA-TGT-TCC-ATT (Seq. ID No. 60); CAC-ATA-GCA-GTG-TTT-GAG (Seq. ID No. 61); CTC-AAG-GCG-GTC-CAA-TTA (Seq. ID No. 62); GAG-TCG-AAA-TGC-ACA-CAT (Seq. ID No. 63) and TAC-CAA-GAG-GAA-TGT-TGC (Seq. ID No. 64);

the one or more PNA probes of the set that are specific for detecting human chromosome 8 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

ACG-GGA-TGC-AAT-ATA-AAA (Seq. ID No. 65); TGA-AGA-TTC-TGC-ATA-CGG (Seq. ID No. 66); AAG-GTT-TGT-ACT-GAC-AGA (Seq. ID No. 67); CTG-AAC-TAT-GGT-GAA-AAA (Seq. ID No. 68); ACT-AAC-TGT-GCT-GAA-CAT (Seq. ID No. 69) and CCC-ATG-AAT-GCG-AGA-TAG (Seq. ID No. 70);

the one or more PNA probes of the set that are specific for detecting human chromosome 10 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

AAC-TGA-ACG-CAC-AGA-TGA (Seq. ID No. 71); GGC-TAA-TCT-TTG-AAA-TTG-AAA (Seq. ID No. 72); AGG-TGG-ATA-ATT-GGC-CCT (Seq. ID No. 73); TGA-AGT-CCA-AAA-AAG-CAC (Seq. ID No. 74); CTT-AGA-CAT-GGA-AAT-ATC (Seq. ID No. 75); AAG-GGG-TCT-AAC-TAA-TCA (Seq. ID No. 76) and GTA-GTT-GTT-GAG-AAT-GAT (Seq. ID No. 77);

the one or more PNA probes of the set that are specific for detecting human chromosome 11 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

AAC-TTC-CCA-GAA-CTA-CAC (Seq. ID No. 78); ATT-CTT-GAA-ATG-GAA-CAC (Seq. ID No. 79); CTG-TGA-TTG-CTG-ATT-TGG (Seq. ID No. 80); GTC-ATC-ACA-GGA-AAC-ATT (Seq. ID No. 81); GAA-ATT-TCC-TGT-TGA-CAG-A (Seq. ID No. 82) and GTT-TGA-AAG-CTG-AAC-TAT-G (Seq. ID No. 83);

the one or more PNA probes of the set that are specific for detecting human chromosome 12 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

TCC-TGT-AAT-GTT-CGA-CAG (Seq. ID No. 84); TCA-TAG-AAC-GCT-AGA-AAG (Seq. ID No. 85); ACC-TTT-CTT-TTG-ATG-AAG-GA (Seq. ID No. 86); CAA-ATA-TCA-CAA-AAA-GAG-GG (Seq. ID No. 87); GAG-TTG-AAT-AGA-GGC-AAC (Seq. ID No. 88); GGC-CAA-ATG-TAG-AAA-AGG (Seq. ID No. 89); GCG-TTC-AAC-TCA-AGG-TGT (Seq. ID No. 90); TGT-CCT-TTA-GAC-AGA-GCA (Seq. ID No. 91); TGA-GAC-CAA-ATG-TAC-AAA-AG (Seq. ID No. 92); GAA-TAC-TGA-GTA-AGT-TCT-TTG (Seq. ID No. 93); AAC-TGC-ACA-AAT-AGG-GTG (Seq. ID No. 94); TGG-AGA-CAC-TGT-GTT-TGT (Seq. ID No. 95) and CCA-GTT-GGA-GAT-TTC-AAT (Seq. ID No. 96);

the one or more PNA probes of the set that are specific for detecting human chromosome 16 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

GAA-GCC-TGC-CAG-TGG-ATA (Seq. ID No. 97); TAC-AGC-ATT-CTG-GAA-ACC (Seq. ID No. 98); CCA-GAC-ACT-GCG-TAG-TGA (Seq. ID No. 99); ATA-TAA-TGC-TAG-AGG-GAG (Seq. ID No. 100) and AAA-AAC-AAG-ACA-AAC-TCG (Seq. ID No. 101);

the one or more PNA probes of the set that are specific for detecting human chromosome 17 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

ATT-TCA-GCT-GAC-TAA-ACA (Seq. ID No. 102); AAC-GAA-TTA-TGG-TCA-CAT (Seq. ID No. 103); GGT-GAC-GAC-TGA-GTT-TAA (Seq. ID No. 104); TTT-GGA-CCA-CTC-TGT-GGC (Seq. ID No. 105); AAC-GGG-ATA-ACT-GCA-CCT (Seq. ID No. 106); TTT-GTG-GTT-TGT-GGT-GGA (Seq. ID No. 107); AGG-GAA-TAG-CTT-CAT-AGA (Seq. ID No. 108); ATC-ACG-AAG-AAG-GTT-CTG (Seq. ID No. 109); CCG-AAG-ATG-TCT-TTG-GAA (Seq. ID No. 110) and AAA-GAG-GTC-TAC-ATG-TCC (Seq. ID No. 111);

the one or more PNA probes of the set that are specific for detecting human chromosome 18 comprise a probing nucleobase sequence, or their complements, selected from the group consisting of:

TTC-CCG-TAA-CAA-CTA-TGC (Seq. ID No. 112); TCC-CGT-AAC-AAC-TAG-GCA (Seq. ID No. 113); AAA-AGG-AGT-GAT-CCA-ACC (Seq. ID No. 114); TCC-CTT-TGG-TAG-AGC-AGG (Seq. ID No. 115); ATT-TGA-GAT-GTG-TGT-ACT-CA (Seq. ID No. 116); GCA-CTT-ACC-GGC-CTA-AG (Seq. ID No. 117) and CTC-AGA-AAC-TTA-CTC-GTG (Seq. ID No. 118).

(Claims 11-12, Canceled)

(Claims 13-28, Previously Canceled)

(Claim 29, Canceled)

(Claim 30, Previously Canceled)

(Claim 31, Canceled)

(Claim 32, Previously canceled)

(Claims 33 & 34; Canceled)

(Claims 35-37, Previously Canceled)

(Claims 38-40, Canceled)

(Claims 41-44, Previously Canceled)

(Claim 45, Canceled

(Claim 46, Previously, Canceled)

(Claim 47, Canceled)

(Claim 48, Previously, Canceled)

(Claim 49; Canceled)

(Claims 51-53, Previously Canceled)

(Claims 54, Canceled)

55. (Presently Amended) The method of claim ~~40~~ 10, wherein at least one probe is labeled with a detectable moiety.

56. (Presently Amended) The method of claim 55, wherein the detectable moiety ~~or moieties are selected from the group consisting of:~~ is a dextran conjugate, a branched nucleic acid detection system, a chromophore, a fluorophore, a spin label, a radioisotope, an enzyme, a hapten, an acridinium ester ~~and~~ or a chemiluminescent compound.

(Claims 57-63, Previously Canceled)

(Claims 64-66, Canceled)

(Claims 67-77, Previously Canceled)

(Claims 78-81, Canceled)

(iii) Remarks On The Amendment To The Claims:

With this amendment, only claims 10, 55 and 56 remain pending. Claims 55 and 56 have been amended so that they now depend from claim 10. Only the dependency of claim 55 was amended. Amendments to claim 56 are cosmetic and intended to clarify the claim language.

Claim 10 has been amended to incorporate the limitations of claims 11 and 12, with the exception that the amended claim is limited not only to the exact probing nucleobase sequences (see prior claim 12) but also to the complements of those sequences.

If is believed that no new matter has been added.

IV. RESPONSE TO THE OFFICE ACTION REJECTIONS

At paragraph 2 of the Office Action, the Examiner states: "Claim 12 is objected to for being dependent on a rejected claim." However, at paragraph 9 of the Office Action, the Examiner states: "It is noted that claim 12 is free of cited art and 112/1st paragraph rejections. Such claim, however, encompasses nonelected compositions and is thus objected to."

In the restriction requirement dated April 9, 2002, the Examiner identified group XIV as being: "Claims 10-12, drawn to a non nucleic acid probe set having nucleobase sequences directed to detecting human chromosomes X, Y, 1, 2, 3, 6, 8, 10, 12, 16, 17 and 18, classified in class 536, subclass 23.1."

Because of these two apparently conflicting statements, it is unclear from the Office Action whether or not claim 12 is allowable if rewritten in independent form. Applicants have assumed, based upon the clear reading of the restriction requirement, that claim 12 does not go beyond the subject matter identified as group XIV in the restriction requirement and have accordingly, copied the limitations of claims 11 and 12 into claim 10, with one noteworthy exception. Specifically, in addition to limiting the claims to the exact probing nucleobases sequences identified, the claims include complements to these sequences. Though Applicants take notice of the arguments of the Examiner in the Office Action, it is submitted that chromosomes are double stranded. Therefore, if a probe sequence targets one of the two strands of the chromosome and has been found to be effective, it is submitted that the complement to that probe would merely bind to the opposite strand in exactly the same location on the chromosome. Accordingly, even if the Examiner believes that there is insufficient basis in the specification to believe that Applicants are not in possession of sequence variations on the 118 probes sequences, it is submitted that there is no basis to believe that the complement to each of these 118 probes sequences would not be as effective as the identified probe sequences themselves. Accordingly, it is believed that claim 10, as amended is free form art and 35 U.S.C. §112 rejections and is therefore allowable.

Claims 55 and 56 have been amended to be dependent upon amended claim 10. It is believed that since claim 10 should be allowable, claims 55 and 56 should likewise be allowable.

It is respectfully submitted that the present amendments render moot the articulated rejections. Accordingly, it is believed that the rejections should be withdrawn. Reconsideration of the amended claims is requested.

V. SUMMARY

It is believed that this response addresses all rejections set forth in the present Office Action and the application is in ready condition for allowance. In consideration of the preceding amendments and remarks, Applicant hereby respectfully requests reconsideration of all pending claims (as amended), the withdrawal of all rejections set forth in the present Office Action and issue of a Notice of Allowance by The Office.

VI. INTERVIEW

If the Examiner believes a telephonic or personal interview would advance the prosecution of the subject application, the Examiner is invited to contact attorney Gildea during business hours at the telephone or facsimile numbers listed below.

VII. FEES

The petition under 37 C.F.R. §1.136(a) that accompanies this paper includes an authorization to deduct the appropriate fee from Deposit Account 02-3240. A Notice of Appeal and payment of the appropriate fee therefore accompanies the submission of this paper. No additional fees are believed due The Office for consideration of this paper. If however, The Office determines that any other fee is due, authorization is hereby granted to charge any required fee associated with the filing or proper consideration of this paper to Deposit Account 02-3240.

VIII. CORRESPONDENCE/CUSTOMER NUMBER

Please send all correspondence pertaining to this document to:

Applied Biosystems
Attn: Brian D. Gildea, Esq.
15 DeAngelo Drive
Bedford, MA 01730
Telephone: 781-280-2824
Fax: 781-280-2940

IF NOT ALREADY DONE, PLEASE MATCH THIS CASE WITH CUSTOMER NUMBER

23544

Respectfully submitted
on behalf of Applicant,

July 6, 2004
Date

Brian D. Gildea, Esq.
Reg. No. 39,995